

FLIES ON THE FACES OF EGYPTIAN CHILDREN<sup>1</sup>BY J. D. DE COURSEY<sup>2</sup> AND J. S. OTTO<sup>3</sup>

U. S. NAVAL MEDICAL RESEARCH UNIT NO. 3, CAIRO, EGYPT

Flies of the genus *Musca* are present in great numbers in rural Egypt. They are very numerous on the faces of children and may be seen moving continuously from face to face visiting the mucous membranes of the eyes, nose and mouth. This has been considered as contributory to the transmission of certain diseases. According to Matheson (1932), as early as 1888 L. Howe stated that the number of cases of conjunctivitis in Egypt increased in proportion to the increase in flies. Mackie et al. (1948) said that there was positive proof for the fly transmission of thirty different diseases including cholera, typhoid, tetanus, amebic and bacillary dysentery, trachoma, yaws, leprosy, tuberculosis, and certain helminth infections.

Flies breed in human stools scattered more or less indiscriminately throughout the villages. Other types of breeding places are latrine dumps, compost piles, animal rooms, and fuel cakes (Holway 1951). According to Peffly (1953) *Musca sorbens* breeds primarily in human feces and is present in greater proportion than *Musca domestica vicina* in collections of flies from the faces of children. "Therefore, this species may be largely responsible for the tremendously high incidence of various eye infections in Egypt." Holway (1951) said that over 97 percent of 1396 flies trapped and reared were identified as *M. d. vicina*. He further stated that there appears to be general agreement that a very high percentage of the houseflies are *vicina* and he made no attempt to separate the small numbers of other species that might have been present.

It was noted that in July 1955, the percentage of flies taken from the faces of children were about equally *M. sorbens* and

<sup>1</sup> The opinions or assertions contained herein are the private ones of the authors and are not to be construed as official or reflecting the views of the Department or the naval service at large.

<sup>2</sup> Commander (Medical Service Corps), U. S. Navy.

<sup>3</sup> HMC, U. S. Navy.

The authors wish to express their appreciation to Captain C. B. Galloway, MC, USN; C. E. Yunker, and members of W.H.O. for their kind assistance in the conduct of this study.

*M. d. vicina*. The purpose of this study was to determine the relative abundance of the two species on the faces of children throughout the year. Variation of the incidence of the two species during various seasons of the year, might conceivably have a bearing on their role in the transmission of disease.

#### PROCEDURE

Flies were captured during July and August, 1955, from Sindbis village, near Cairo, Egypt. It soon became evident, however, that the cooperation of the inhabitants in Mit Halfa, a similar village, was such that the flies could be collected more rapidly. Investigation indicated that the incidence of the two common species of *Musca* was approximately the same in Mit Halfa in September as they had been in Sindbis during the month of August. All flies from September 1955 through June 1956 were taken from Mit Halfa.

*M. sorbens* and *M. d. vicina* were the only species considered. No effort was made to separate the "domestica complex" i.e. *vicina* and *cuthbertsoni* (including the form *nebulo* Fabr.), since progeny of *vicina* and *cuthbertsoni* overlap slightly in certain combinations of characters (Sabrosky 1952).

The flies were collected regularly between the hours of 9 and 11 in the morning throughout the year. A plastic centrifuge tube one and one-fourth inches in diameter was utilized to capture individual flies, the open end being placed against the child's face over the fly. Two hundred tubes were used during each day's collection. More than one fly was often captured in a tube, due to the abundance of the flies.

Periodically, a sweep net was used throughout the village over fruit, vegetables, fresh meat, garbage and feces. This was done to determine the relative incidence of the two species of flies in such locations for comparison with those taken from faces.

#### DISCUSSION

As stated above, Peffly found that *M. sorbens* was the most common species emerging from human stools throughout the year. It also occurred in all other breeding materials, but the greater numbers came from latrine dumps and compost heaps. The adults were attracted to the moist, sweet surfaces of sugarcane, dates, oranges, and to freshly butchered meat. Patton (1936) noted this species sitting on food stuffs of all kinds, and com-

monly feeding on secretions from sores, wounds and particularly on discharges from the eyes. In view of these habits, he believed it to be an important carrier of pathogenic organisms, especially of bacteria which cause conjunctivitis and other diseased conditions of the eyes. Sabrosky (1952) collected *M. sorbens* in many places in Egypt, but did not find it abundant anywhere. He considered its habits to be so unlike *M. d. vicina* that ordinary collecting methods did not give a fair idea of individuals per unit area. Meng and Winfield (1938), working in China, found the density of *M. sorbens* out of doors to be about equal to that of other species.

*M. d. vicina* breeds in various kinds of animal excrement, prefers horse and human excrement as an oviposition media, but is found mostly in latrine dumps, animal stables, and compost piles (Peffly 1953). According to Holway (1951), outside counts began to drop in May, were extremely low during July and August, but increased again during the Fall. They showed an abrupt drop the latter part of December, continuing to decline through January, to the annual low point in February. Peffly noted *M. d. vicina* at times, feeding at muco-cutaneous margins of children's eyes, noses, and mouths. He found the other member of the "complex," *cuthbertsoni* on children's faces and on freshly butchered meats. *M. d. vicina* was attracted to dung, vegetables and animal refuse for feeding and ovipositing.

#### RESULTS

In the present study a total of 8,719 flies were taken from children's faces throughout the year. Four thousand three hundred fifty-two of these were *M. d. vicina* (49.9%), of which 87.9 percent were females, and 4,367 were *M. sorbens* (50.1%) with 80 percent females. This indicates that the flies taken from faces did not follow the population trend as shown by Holway (1951) for those trapped and reared from two villages (97 percent *M. d. vicina*). During the year the ratio of *vicina* vs. *sorbens* changed. The ratio was approximately one to one from August through October. *M. d. vicina* increased to 85.2 percent of the total collected from November to December, and by January had reached 98.6 percent with *M. sorbens* at the low rate of 1.4 percent. *M. sorbens* gradually took the lead from February to April reaching 63.6 percent, and by June it had increased to 88 percent (Table 1).

TABLE 1. *Musca domestica vicina* and *M. sorbens* collected in two Egyptian villages.

Date	No. visits during month	Area	Flies Collected from Faces of Children						Flies Collected with a Sweep Net											
			<i>M. d. vicina</i>			<i>M. sorbens</i>			<i>M. d. vicina</i>			<i>M. sorbens</i>								
			♀	♂	♀ & ♂	♀	♂	♀ & ♂	♀	♂	♀ & ♂	♀	♂	♀ & ♂	Total % <i>M. vic.</i>	Total % <i>M. sorb.</i>				
July 1955	5	Sindbis	274	55	329	337	58	395	724	45.4	54.6									
Aug 1955	15	Sindbis	913	175	1088	964	271	1235	2323	46.8	53.2									
Sep 1955	2	Mit Halka	144	23	167	154	36	190	357	46.8	53.2	245	268	513	1	2	515	99.6	0.4	
Oct 1955	2	"	125	20	145	113	30	143	288	50.3	49.7									
Nov 1955	4	"	283	31	314	196	52	248	562	55.9	44.1	130	146	276	1	0	1	277	99.6	0.4
Dec 1955	1	"	120	7	127	19	3	22	149	85.2	14.8									
Jan 1956	4	"	732	90	822	10	2	12	834	98.6	1.4									
Feb 1956	2	"	359	24	383	44	5	49	432	88.7	11.3									
Mar 1956	2	"	258	23	281	113	14	127	408	68.9	31.1									
Apr 1956	6	"	444	42	486	686	162	848	1334	36.4	63.6	876	239	1115	16	3	19	1134	98.3	1.7
May 1956	3	"	125	24	149	491	158	649	798	18.7	81.3									
*June 1956	2	"	48	13	61	366	83	449	510	12.0	88.0	913	411	1324	56	12	68	1392	95.1	4.9
Totals for Year			3825	527	4352	3493	874	4367	8719	49.9	50.1	2164	1064	3228	74	16	90	3318	97.3	2.7

\* During the month of June, collections from faces were stopped on the 11th with 88% *M. sorbens*. Sweepings on that date yielded 21.5% *M. sorbens* with only 205 insects. An extra sweeping was made on 27 June with 1,131 insects collected of which 1.05% were *M. sorbens*. This brought the monthly total to 1,392 insects with 4.9% *M. sorbens*.

The ratio of *M. sorbens* to *M. d. vicina* collected from the faces of children throughout the year is shown diagrammatically in Figure 1 together with the mean temperatures and humidities

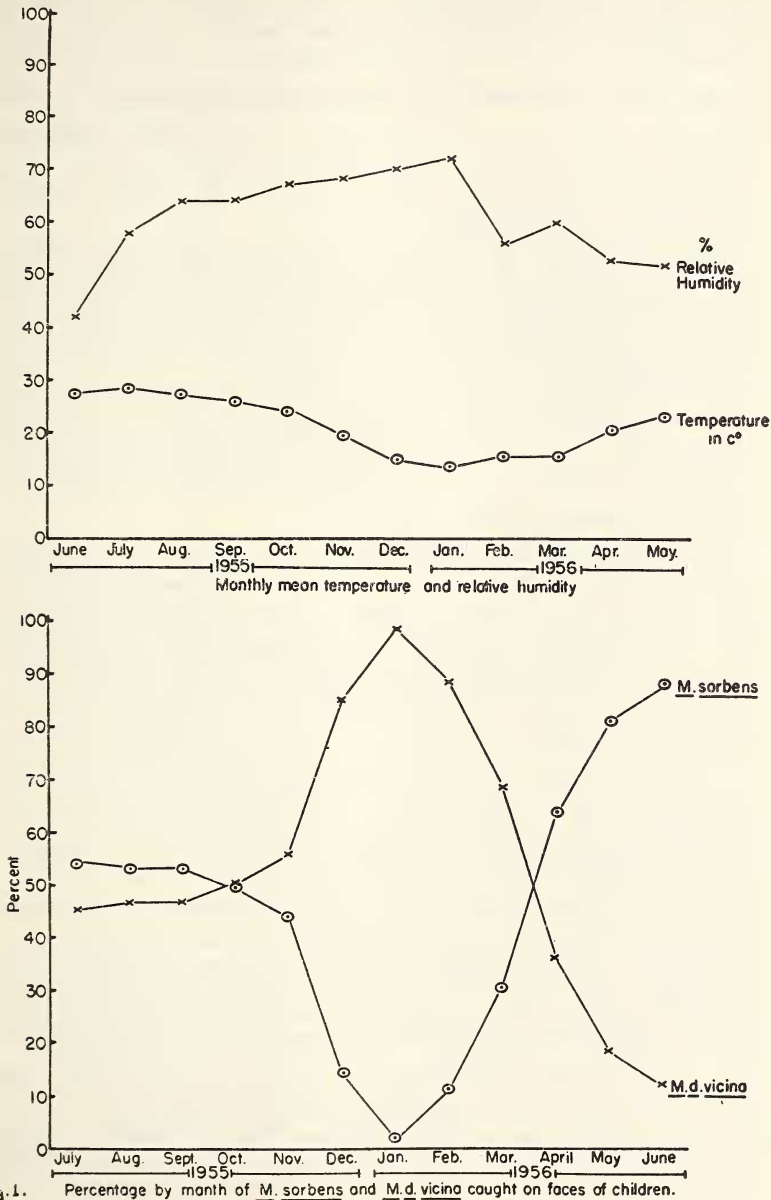


Fig. 1. Percentage by month of *M. sorbens* and *M. d. vicina* caught on faces of children.

registered for the Cairo area. It is clear that *M. d. vicina* was predominant on faces from December through March and *M. sorbens* from April to July. Sabrosky (1952) working during June and July 1950 states that "In my experience, *sorbens* was more often directly annoying to humans than either *vicina* or *cuthbertsoni*. In Cairo, about two-thirds of the flies that were collected while annoying me were *sorbens*, even though general Cairo collections were overwhelmingly *vicina* and *cuthbertsoni*." The data given in Table 1 does not show population trends for the two species, but the ratio of *M. d. vicina* to *M. sorbens* collected from the faces of children.

Male and female *M. d. vicina* occasionally had small unidentified mites of the Sub Order Megostegmata attached between the coxae of the forelegs. One fly was noted to be carrying 39 such mites. A larger mite, *Machrocheles* sp. was also attached singly to the flies. Bonier and Gaschen (1944) found as many as 35 mites on individual flies, firmly attached and engorged with hemolymph. "It appeared that the parasitism caused intense hunger in the flies as they attacked man freely and ignored attempts to disturb them."

Flies were collected with a sweep net over fruit, vegetables, garbage, fresh meat, and feces (human, dog, goat, camel, sheep, horse, donkey and water buffalo). Sweepings were especially made over fresh human feces, since human stools are the principal source of *M. sorbens* in Egyptian villages (Peffly 1953). The net was used during four months of the year before the incidence of *M. sorbens* on children's faces had markedly declined. In September and November, 1955 when 53 and 44 percent respectively of *M. sorbens* were removed from the faces the net yielded only 0.4 percent of this species in 792 flies. In April, 1956, when *M. d. vicina* was declining and 63.6 percent *M. sorbens* was removed from faces, sweepings gave 1.7 percent of the latter species (1,115 flies). In June the rate on faces was 88 percent *M. sorbens* and the sweepings showed only 4.9 percent of 1,392 flies (Table 1\*). This would seem to indicate that the use of a net over fly breeding and feeding areas does not give a true picture of the relative populations of the two species. This bears out Sabrosky's (1952) contention that the habits of *M. sorbens* were so unlike those of *M. d. vicina* that ordinary collecting methods did not give a fair idea of individuals per unit area.

Certainly, *M. sorbens* was not taken in numbers by sweeping close to the ground, and this would seem to indicate that a true estimate of the incidence of this species would not be obtained through the use of the Scudder grill although no studies were made with this equipment. In this connection, Peffly (1953) stated that "the use of Scudder's grill to determine the fly index provides a means for comparison of densities but does not provide a true population estimate."

#### SUMMARY

Flies were collected from the faces of children from July 1955 through June 1956. A total of 8,719 flies were taken in this manner throughout the year, 49.9 percent were *Musca domestica vicina* Macq. and 50.1 percent were *M. sorbens* Wied. The former was predominant on faces from December through March and the latter from April to July. Mites were attached to a number of the flies. The use of a sweep net over fly breeding and feeding materials does not give a true estimate of the incidence of the two species considered.

#### Bibliography

- BONIER, G. AND GASCHEN, H. 1944. Sur quelques parasites de dipters piqueurs. Mitt Schweiz Ent. Ges 19 pt, 6: 191-197, Berne. (Abs. R.A.E. B 35: 44, 1947).
- HOLWAY, R. T., MITCHELL, W. A. AND SALAH, A. A. 1951. Studies on the seasonal prevalence and dispersal of the Egyptian house fly. I. The adult flies. Ann. Ent. Soc. Amer. 44(3): 381-398.
- MACKIE, T. T., HUNTER, G. W. III, AND WORTH, C. B. 1948. A manual of tropical disease.
- MATHESON, R. M. 1932. Charles C Thomas Publ. 1: 361.
- MENG, C. H. AND WINFIELD, G. F. 1938. Studies on the control of fecal-borne diseases in North China. V. A preliminary study of the density, species makeup and breeding habits of the house frequenting fly population of Tsian, Shantung, China. China Med. Jour. Suppl. 2: 463-486.
- PATTON, W. S. 1936. Studies on the higher Diptera of medical and veterinary importance. A revision of the species of the genus *Musca* based on a comparative study of the male terminalia. III. A practical guide to the Ethiopian species. Ann. Trop. Med. and Hyg. 30: 469-490.
- PEFFLY, R. L. 1953. The relative importance of different fly-breeding materials in an Egyptian village. Jour. Egypt. Pub. Hlth Assn. 23: 167-180.
- PEFFLY, R. L. 1953. A summary of recent studies on house flies in Egypt. Jour. Egypt. Pub. Hlth Assn. 23: 55-74.
- SABROSKY, C. W. 1952. House flies in Egypt. Amer. Jour. Trop. Med. and Hyg. 1(2): 333-336.